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W.O. 1204

16 April 1965

Pre Life Test Sequence For FLPA-200 Units

Technical Report 1204-1002

25X1A

16 April 1965  
Compiled by: [REDACTED]

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TECHNICAL REPORT 1204-1002

PRE-LIFE TEST SEQUENCE FOR FLPA 200 UNITS

This technical report indicates the procedure for processing the FLPA 200 (FSDS Dwg. No. RDP-10.032) on arrival from the manufacturer through all steps necessary for completion of the desired test series as indicated on Figure 1.

1.0 RECEIPT OF UNIT

Upon receipt of the FLPA-200 from [REDACTED]

1. Remove from box - saving screws, padding, box, etc.
2. Perform a visual checkout and report unit faults to engineer.
3. Give enclosed test spectroscopic plate to the engineer.

WARNING: AT ALL TIMES WHEN THE FLPA-200 UNIT IS NOT RECORDING ON FILM, IT MUST BE MOUNTED WITHIN THE PLASTIC PROTECTIVE CASE.

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1.1 PRECAUTIONS APPLICABLE TO THE FLPA-200

 Drawing RDP-10.032A)

- 1) MOUNTING SCREWS TO USE NO MORE THAN 0.125" PROTRUSION INTO BASE. (BASE IS COPPER TELLURIUM).
- 2) USE ONLY VERTICAL LOADING ON MYLAR WINDOW - I. E. COME STRAIGHT DOWN ON WINDOW.
- 3) 3 MIL THICK MYLAR WINDOW IS CEMENTED TO FRAME BY HEAT AND FORCE.
  - AVOID USE OF SOLVENTS OF CEMENT TO CLEAN WINDOW
  - AVOID USE OF HOT TEMPERATURE SUCH AS HEAT GUN.
- 4) LIMITS ON THE ALLOWABLE EXPOSURE LEVEL ARE ILLUSTRATED IN ATTACHED FIGURE 10.

2.0 CONNECTOR POTTING

Using the available breadboard mold, remove the black plastic connector assembly case and pot the back of the connector assembly.

1. Cover up the electrical contacts of the connector with masking tape to prevent potting compound fouling contacts.
2. Carefully tape plastic pieces to connector base forming potting boot.
3. Insert plastic tubing to allow continued access to the hold down screw slot from the back of the assembly.

4. Mount on plywood board as illustrated in Figure 2.
5. Fill with potting mixture. Use Hysol silicone RTV as potting compound and Hysol RTV G192C as catalyst. The compound cure requires 8 hours at room temperature. It is desirable that this be performed at the end of the day, overnight, so that it will be ready to operate the next working day.
6. Remove and save plastic pieces. Trim corners with razor blade.

### 3.0 HEAD SHIMMING

- #### 3.1 HEAD SHIMMING BY OPTICAL MEASUREMENTS (This proved to be too inaccurate to use and this step was deleted for the majority of heads).

##### General:

Using a Bausch and Lomb Optical Focusing Microscope, focus first on the FLPA-200 record surfaces above each of the 4 corners of the silicon chip. Then note the differential reading to adjust the focus to the surface of the silicon chip. This represents the optical path length within the record head.

Detail: The measurement procedure will be given in more detail.

- a. Remove head (from plastic box and save box and screws etc.
- b. Mounting head on Film Handling Fixture (1089F14). Remove knurled knob and the angled mounting block from table. Attach

head to mounting block with 2 screws. These screws must not intrude into the head more than 1/16" otherwise serious damage may result. (See Figures 3, 4, and 5).

Due to the slop in the two screwholes in the mounting angle, some way must be devised to be sure that the head is exactly parallel to table. In one plane there is limited control, but in the other plane, there is complete control. It is important that this control be used to get nearly perfect parallellism. Mount the head assembly on table omitting the horseshoe spacer so that the two mounting screws are accessible. Work the head up by turning the knurled knob until the edge at the head is almost as high as the edge at the table. Sight along the two edges and adjust by loosening screws and retightening until the edges are parallel. This is a hit or miss method, but a high degree of accuracy can be obtained by careful adjustment. Insert one of the spacers and turn knurled knob up tight.

c. Make ink marks on mylar surface. Focus an ink mark on mounting side and record the reading. Move over to the other ink mark and repeat process. Next focus on recording surface at mounting side and at far side, record the readings. (See Figure 6 and 7).

- d. If it is found that the mylar surface is not parallel to the recording surface by .001 or more, the difference must be made up with an appropriate shim. See Fig. 8.

3.2 HEAD SHIMMING BY FILM EXPOSURE (Run 1 through 3 on Figure 1)

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The detail procedure to expose film with the FLPA-200 using the Film Handling Fixture and the Test Set is given in [REDACTED] Technical Reports 1204-1003 and 1204-1004.

Adjust the SLP test set controls to yield an exposure of 60 milliamperes for 0.75 milliseconds, and turn off the lights.

Use the Static Master Brush (Nuclear Products Inc., 10173 East Rush Street, P.O. Box 649, El Monte, California) to remove dust from vacuum platen. Apply live Plus X (ASA 80) film to the vacuum platen with the emulsion side facing out. Brush the dust off the film emulsion. Apply the FLPA 200 to the film and make 3 separate exposures on the film. For each exposure, press the SLP test set "Set" button. Repeat the process two times with an 1 mil shim on first one end and then the other end of the FLPA-200 record surface.

Apply the step wedge to the emulsion side of the film using the EG and G Mark VI Sensitometer using 1.83 neutral density filter in the transmission path. Process the film using D-19 developer whose temperature is  $68 \pm 1^{\circ}\text{F}$  for developing time of 5 minutes.

### 3.3 Slide Preparation

Prepare the recorded Code Matrix Blocks for microdensitometer measurements by mounting as shown in Figure 9. Don't use taping between the glass plates.

### 3.4 Microdensitometry (Runs 1 through 3 per Figure 1)

Use the Ansco Model 4A Microdensitometer to scan columns one and six, each of 32 dots. Use the 25 micron aperture and a recording scale factor of 2 inch equal to 1 millimeter scan head travel.

Use Macbeth Ansco Densitometer (1232-87) or equivalent to measure the density of the steps of the step wedge.

### 3.5 Data Evaluation

Note the shim arrangement that yielded equal dot peak density along the column length. It indicates the nonalignment present in each record head and in future runs one can obtain coplanarity between film emulsion and plane of light emitting sources.

Dot diameter and peak density are a measure of the optical transmission path length from the Record Head emitting surface to the film and can be used to insure that optical measurements were correct.

### 4.0 Data Runs (Runs 5 through 59 per Figure 1)

After the necessary shimming for the individual Record Head is known, the test sequence (Exposure 5 through 59) outlined in Figure 1 is performed.

Three types of film are to be used: High Definition Aerial Film EK 4404 (ASA 1.6), Plus X Aerecon Type 5401 (ASA80), and Tri X Aerecon type 8403 (ASA200).

All physically possible optical transmission paths of 6, 7, 9 and 11 mils from record surface to film emulsion will be used for each Record Head as indicated in the particular exposure.

On each annotated piece of film a step wedge must be recorded using the Edgerton Germeshausen and Grier Mark VI Sensitometer using  $10^{-3}$  second Exposure and the appropriate neutral density filter in the transmission path.

ASA 1.6	.79 neutral density filter
ASA 80	.79 n. d. + 1.04 n. d. filter
ASA 200	.79 n. d. +1.04 n. d. filter

The vacuum platen and vacuum system will be used to hold the film flat. Use the Static Master Brush on the platen and film to eliminate dust from each new strip of film.

4.1 Detailed Procedure (Suggested Optimum Test Sequence)

4.1.1 To Expose ASA 1.6 Film

- a. Adjust the SLP Test Set (1089F23) exposure control switches to the following: [REDACTED] Technical Report 1204-1006)

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Pulse Width Control

Current Level Control

<u>Position</u>	<u>Milliseconds</u>	<u>Position</u>	<u>Milliamperes</u>
1	12	1	10
2	24	2	20
3	48	3	40
4	96	4	80

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- b. Use the Test Set [REDACTED] Technical Report 1204-1003) and the Film Handling Fixture [REDACTED] Technical Report 1204-1004) to aid in exposing the film. The supply of ASA 1.6 was 35mm film.
- c. Expose step wedge to the emulsion side. Use only 0.79 Neutral Density filter.
- d. Make the following sequence of exposures on the emulsion side.

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<u>FRAME NO.</u>	<u>TIME MS</u>	<u>CURRENT MA</u>	<u>PULSE WIDTH Switch Position</u>	<u>CURRENT LEVEL Switch Position</u>
7	48	20	3	2
25	48	40	3	3
26	48	20	3	2
27	48	40 (3X)	3	3
36	12	40 (2X)	1	3
37	24	40	2	3
39	96	20 (2X)	4	2
48	12	80	1	4
51	96	10	4	1

Note 1: Try to remember all the switch positions so the entire test can be without turning on lights. If it is necessary to use lights first notch the film at the place where you stopped - can the film - lights on - lights off and resume test after the notch. Be sure to proceed in the proper direction and don't re-expose what is already done.

- e. Process the film using D19 developer which is at 68° farenheit.  
The developing time should be 5 minutes.

4.1.2 To Expose ASA 80 Plus X Film

- a. Reset the SLP Test Set for the following: [REDACTED] Technical  
Report 1204-1006)

<u>PULSE WIDTH</u>		<u>CURRENT LEVEL</u>	
<u>Switch Position</u>	<u>Milliseconds</u>	<u>Switch Position</u>	<u>Milliamperes</u>
1	0.375	1	5
2	0.75	2	10
3	1.5	3	20
4	3.0	4	40
5	48.0	5	60
		6	80

- b. See Step 4.1.1b. The supply of Plus X ASA 80 film is 5 inch perforated film.
- c. Place the 0.79 and 1.04 Neutral Density Filter in the EG and G Mark VI Sensitometer and expose the step wedge on

- d. Make the following exposures on the emulsion side of the film.

<u>FRAME No.</u>	<u>TIME MS</u>	<u>CURRENT MA</u>	<u>PULSE WIDTH Switch Position</u>	<u>CURRENT LEVEL Switch Position</u>
28	3	10	4	2
29	3	20	4	3
30	3	40	4	4
31	3	80	4	5
40	0.375	40	1	4
41	0.75	40	2	4
42	1.5	40	3	4
52	0.375	40	1	4

Use the techniques suggested in Note 1 for notching the film if the lights must be turned on.

- e. Process the film as in Step 4.1.1e

4.1.3 To expose ASA 200 film

- a. Repeat 4.1.2.a
- b. Repeat 4.1.1.b using Tri X film ASA 200; the supply is 70mm perforated film.
- c. Repeat 4.1.2c
- d. Make the following exposures on the emulsion side of the film.

<u>FRAME NO.</u>	<u>TIME MS</u>	<u>CURRENT MA</u>	<u>PULSE WIDTH Switch Position</u>	<u>CURRENT LEVEL Switch Position</u>
32	1.5	10	3	2
33	1.5	20	3	3
34	1.5	40	3	4
35	1.5	80	3	6
44	0.375	40	1	4
45	0.75	40	2	4
47	3.0	40	4	4
49	3.0	5	4	1

e. Repeat 4.1.1.e

4.1.4 Exposing Film By Changing Distance of Record Head to Film

4.1.4.1 For the remaining exposures use the appropriate switches in the SLP Test Set (1089F23) to turn off the following columns and rows:

Columns: 1, 3, 5, 8, 10 and 12.

Rows: 2, 4, 6, 8, 10, 12, and 14.

4.1.4.2 Shim the head so that the optical distance from the silicon chip to the film emulsion is 0.007 inches total. Usually, (depending on the measurements in Section 3.0) this means applying 2 mil shims to both ends of the recording surface of the head in a manner that will elevate the head by 0.002 inches when it is placed on the film while BEING SURE NOT TO COVER UP ANY OF THE RECORDING LIGHT

Suitable shim stock is manufactured by Artus Corporation,  
Englewood, N.J.

4.1.4.3 Cut a 3 inch piece of ASA 1.6 film. Tape, notch, or mark the film so that the start end can always be found. Expose step wedge on the emulsion side of the film. Carefully apply the FLPA record head on the emulsion side of film being careful not to dislodge the shims.

Expose film - see table below and then mark the film with a notch where you stop and put the film in light tight can.

4.1.4.4 Next, cut a piece of ASA 80 film about 2' long and proceed the same way as before. Can the film.

4.1.4.5 Next, repeat process with ASA 200 film. Can the film.

4.1.4.6 Turn on lights and add 2 more strips of 2 mil shim on top of the 2 existing shims making a total of 9 mils optical transmission path. Turn off the lights.

4.1.4.7 Pick from the can the ASA 1.6 film and expose as before according to table below. Start past the notch.

4.1.4.8 Repeat with ASA 80 and ASA 200 film and place all 3 films in the light tight can.

4.1.4.9 Turn on lights and add 2 more strips of 2 mil shim, now making a total of 11 shims. Expose film as before.

<u>FRAME NO.</u>	<u>OPTICAL SPACING</u> inches	<u>FILM TYPE</u>	<u>DEPRESS SET BUTTON</u>	<u>PULSE WIDTH</u> Switch Position	<u>CURRENT LEVEL</u> Switch Position
8	0.007	ASA 1.6	2X	5 (48ms)	3(20MA)
14	0.007	ASA 80	2X	3 (1.5MS)	4(40MA)
20	0.007	ASA200	2X	2 (0.75MS)	4(40MA)
9	0.009	ASA1.6	2X	5 (48MS)	4(40MA)
15	0.009	ASA80	2X	3(1.5MS)	5(60MA)
21	0.009	ASA200	2X	2(0.75MS)	5(60MA)
10	0.011	ASA 1.6	3X	5(48MS)	3(20MA)
16	0.011	ASA 80	2X	3(1.5MS)	6(80MA)
22	0.011	ASA200	2X	2(0.75MS)	6(80MA)

4.1.4.10 Process the films using D-19 developer whose temperature is 68°F and use developing time of 5 minutes.

#### 4.2 Slide Preparation

Prepare the recorded Code Matrix Blocks for microdensitometer measurements by mounting as shown in Figure 9. Don't use tape between the glass plates.

#### 4.3 Microdensitometry

In all cases use 25 micron aperture and a recording scale factor of 2 inch equal to 1 millimeter scan head trace.

For Exposures 5 through 22 use the Ansco Model 4A Microdensitometer to scan Row 10 of the Code Matrix Block through

For Exposures 24 through 59, use the microdensitometer to scan Row 10 of the Code Matrix Block through Column positions 7, 8, 9, 10, 11, and 12. For Exposure 25 use the microdensitometer to scan each column (one through eighteen) through each of the 32 row positions.

Use the Macbeth Ansco Densitometer to measure the density of the steps on the step wedge.

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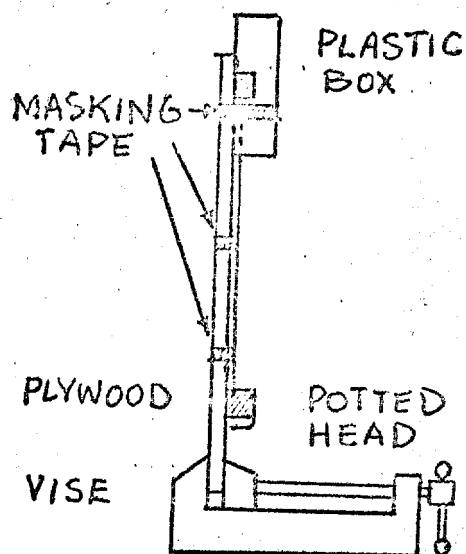


FIGURE 2 SETUP FOR POTTING CONNECTOR

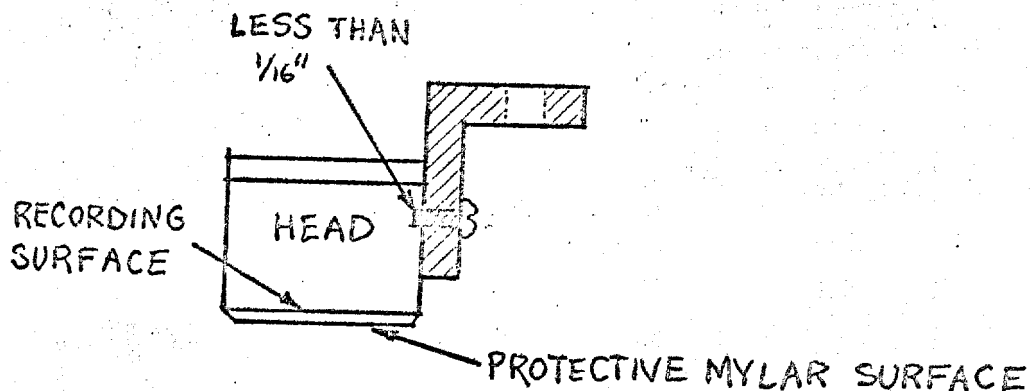


FIGURE 3 ATTACHING FLPA 200 TO MOUNTING ANGLE

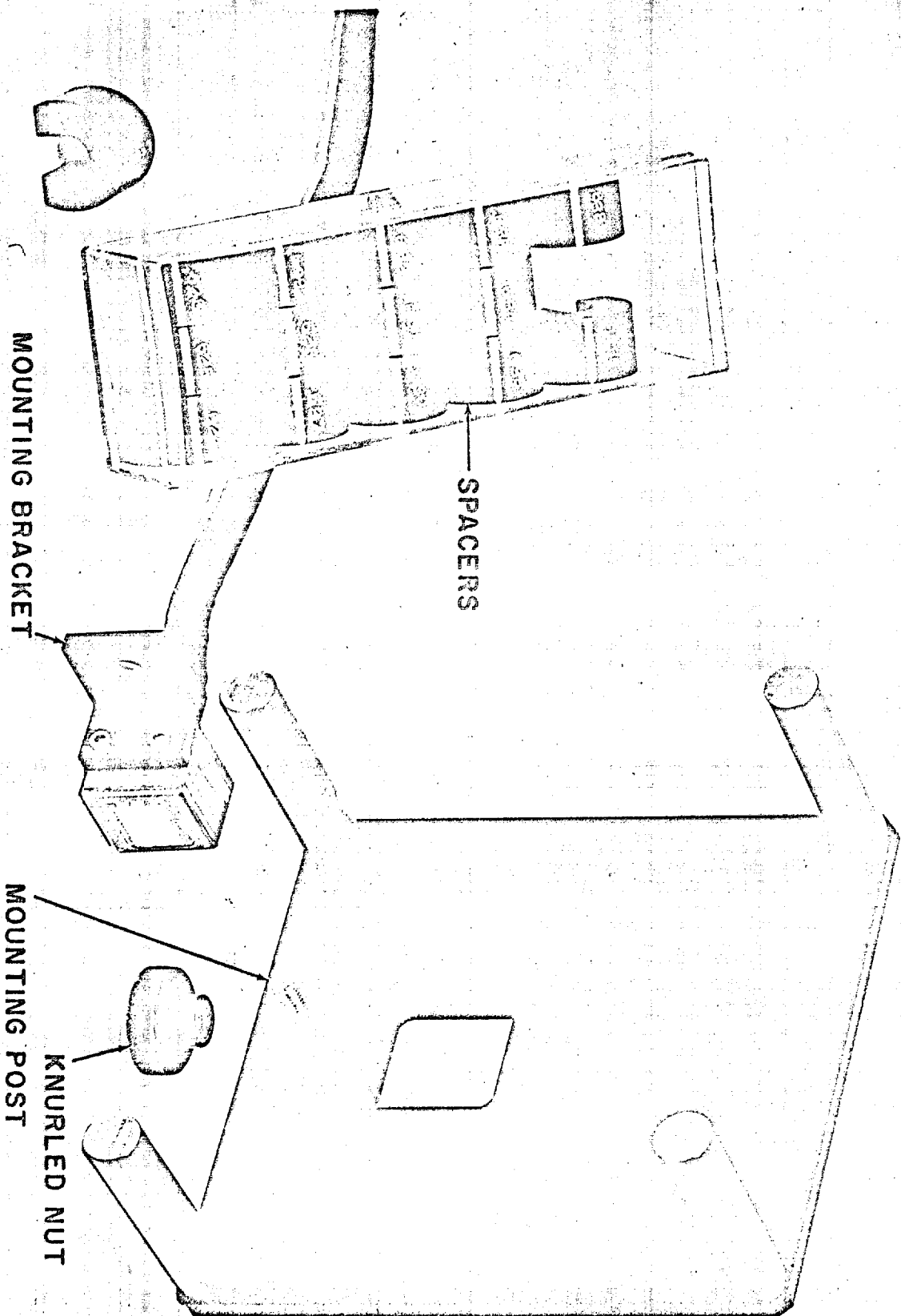
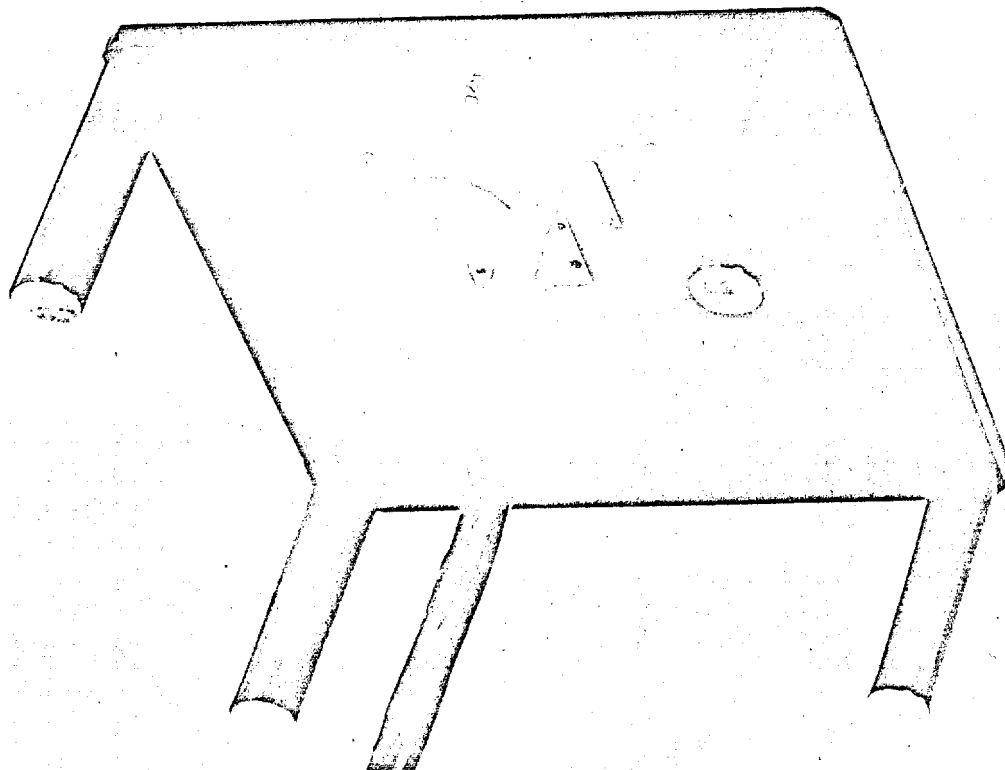
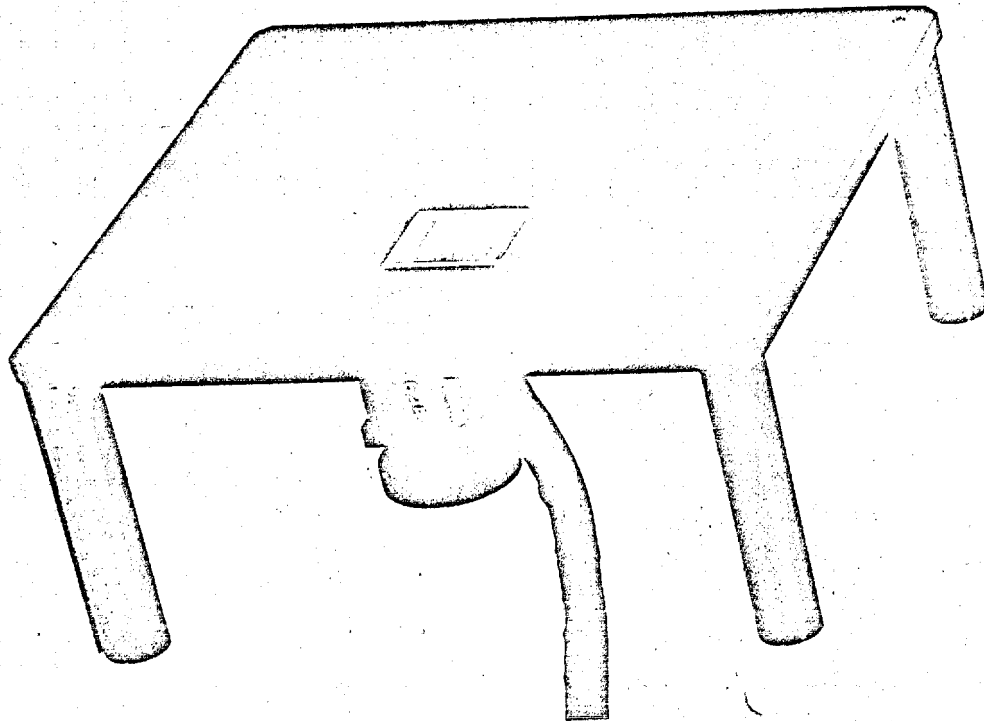


Figure 4. Film Handling Fixture Parts

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Figure 5. Assembled Film Handling Fixture, Front and Rear View



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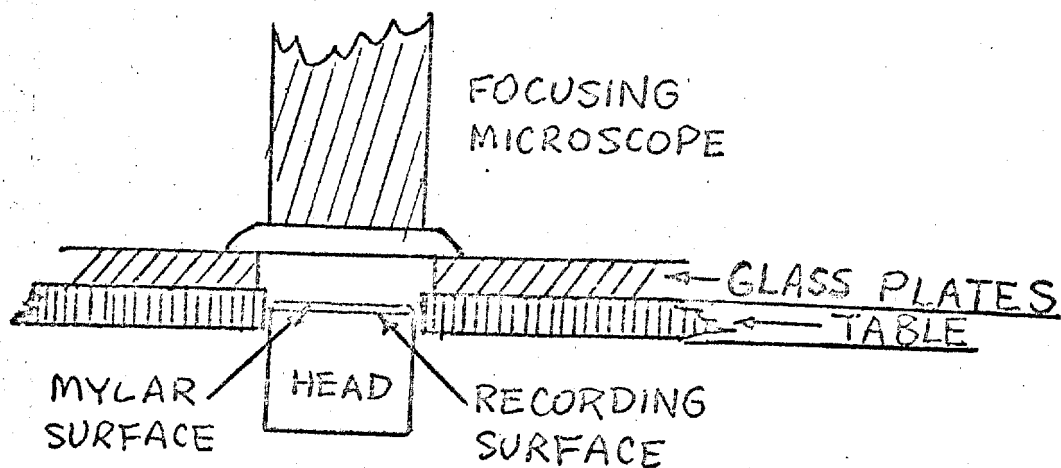


FIGURE 6 OPTICAL PATH LENGTH MEASUREMENT

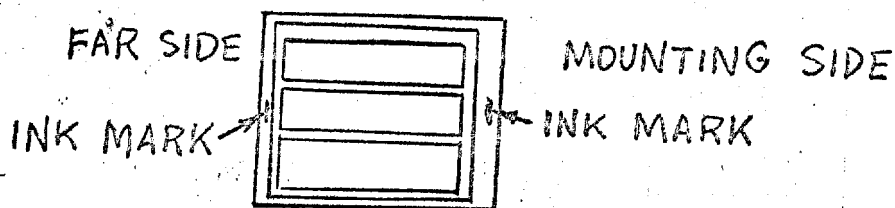


FIGURE 7 FLPA 200 RECORD HEAD

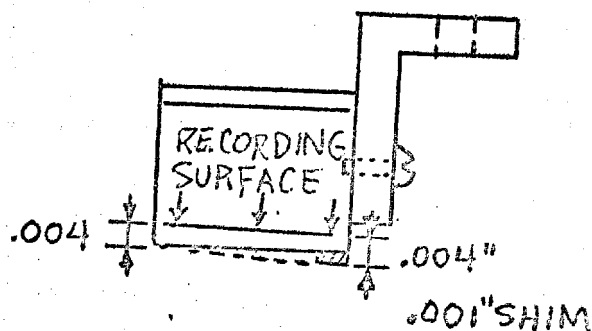
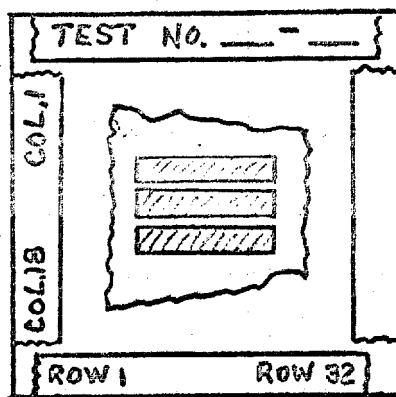


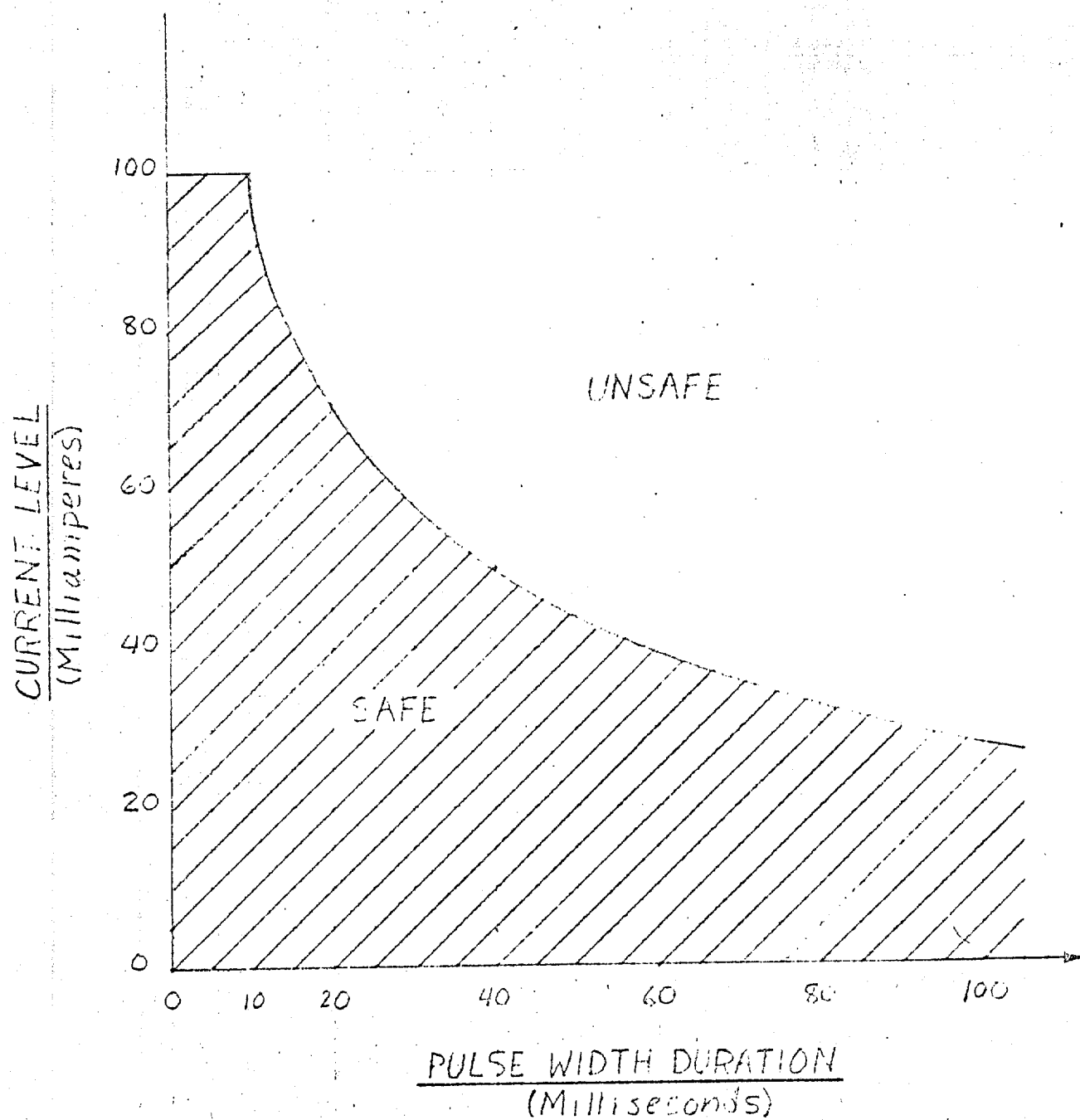
FIGURE 8 NEED FOR RECORD HEAD SHIM

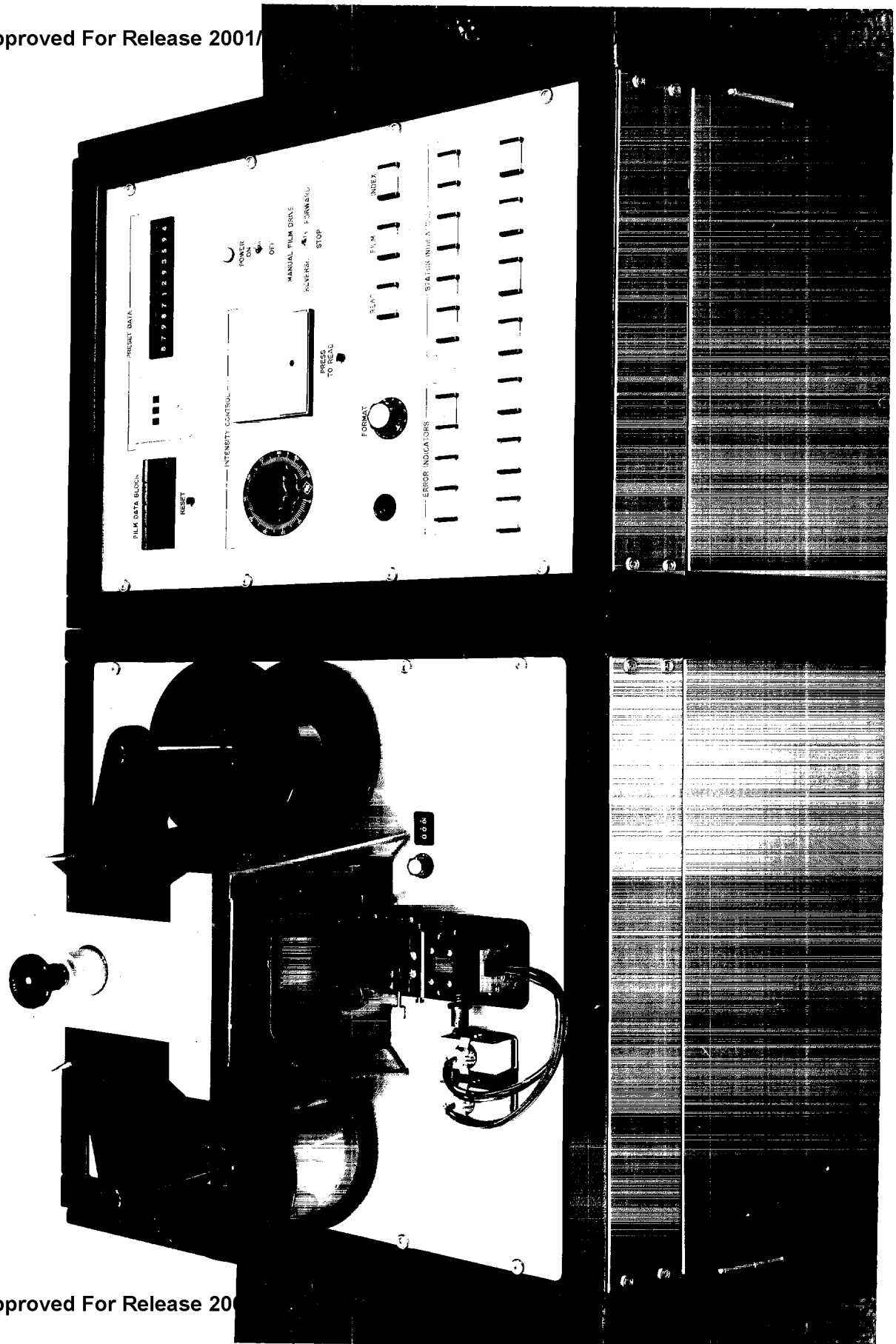
Two  
Transparency Cover  
Glass Plates (2"x2")

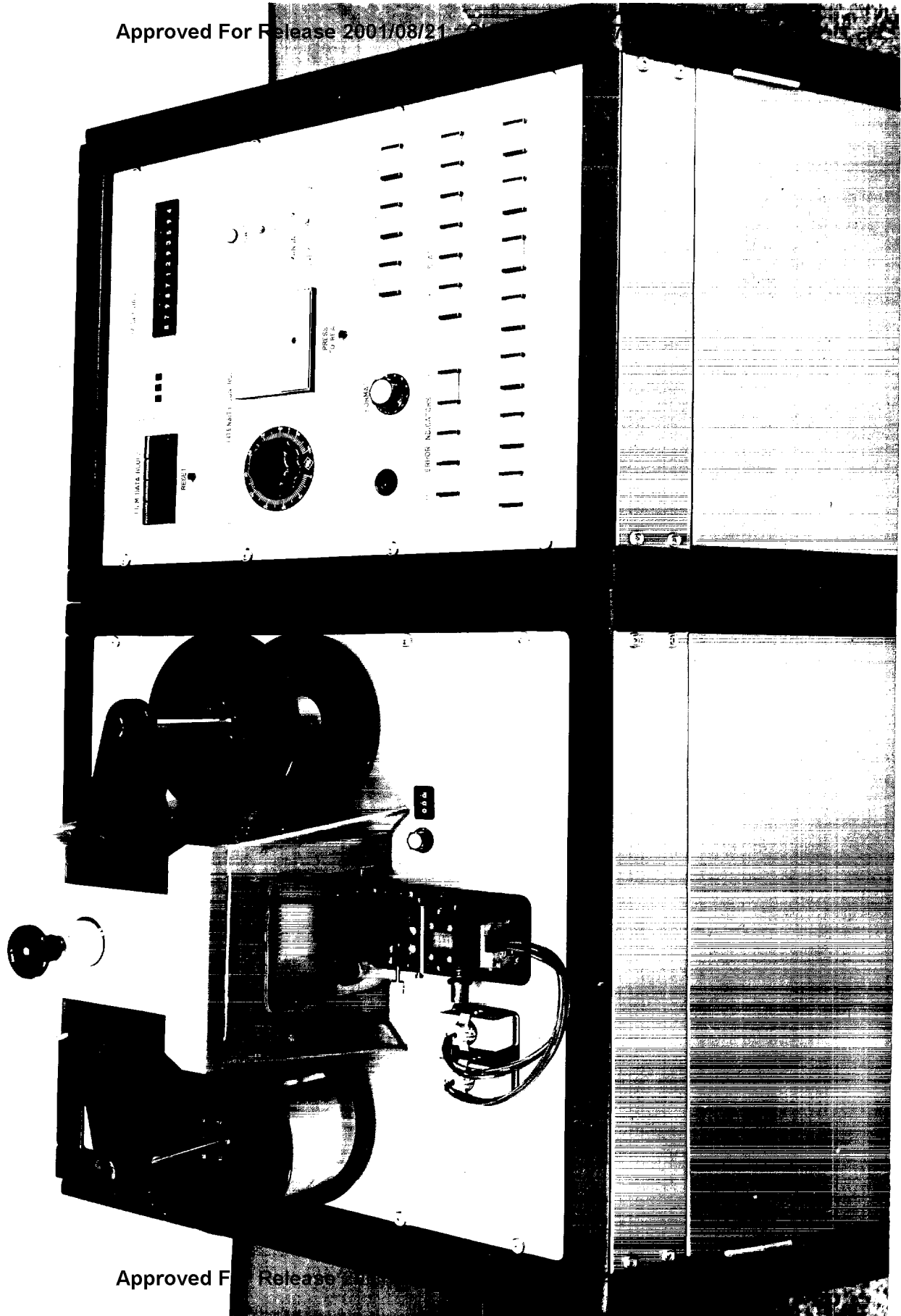


FILM (Emulsion side up)

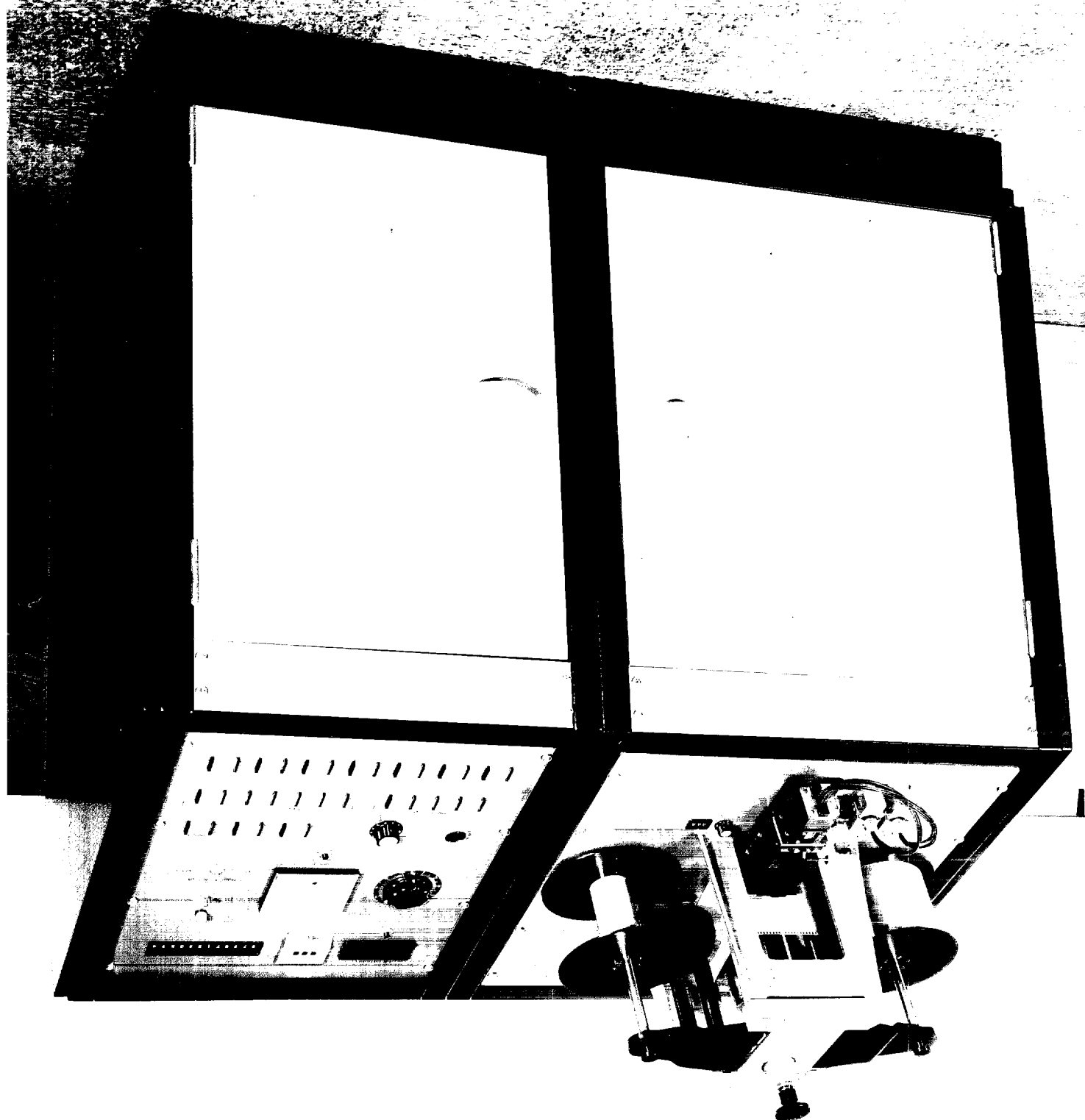
FIGURE 9 - MOUNTING CODE MATRIX BLOCKS





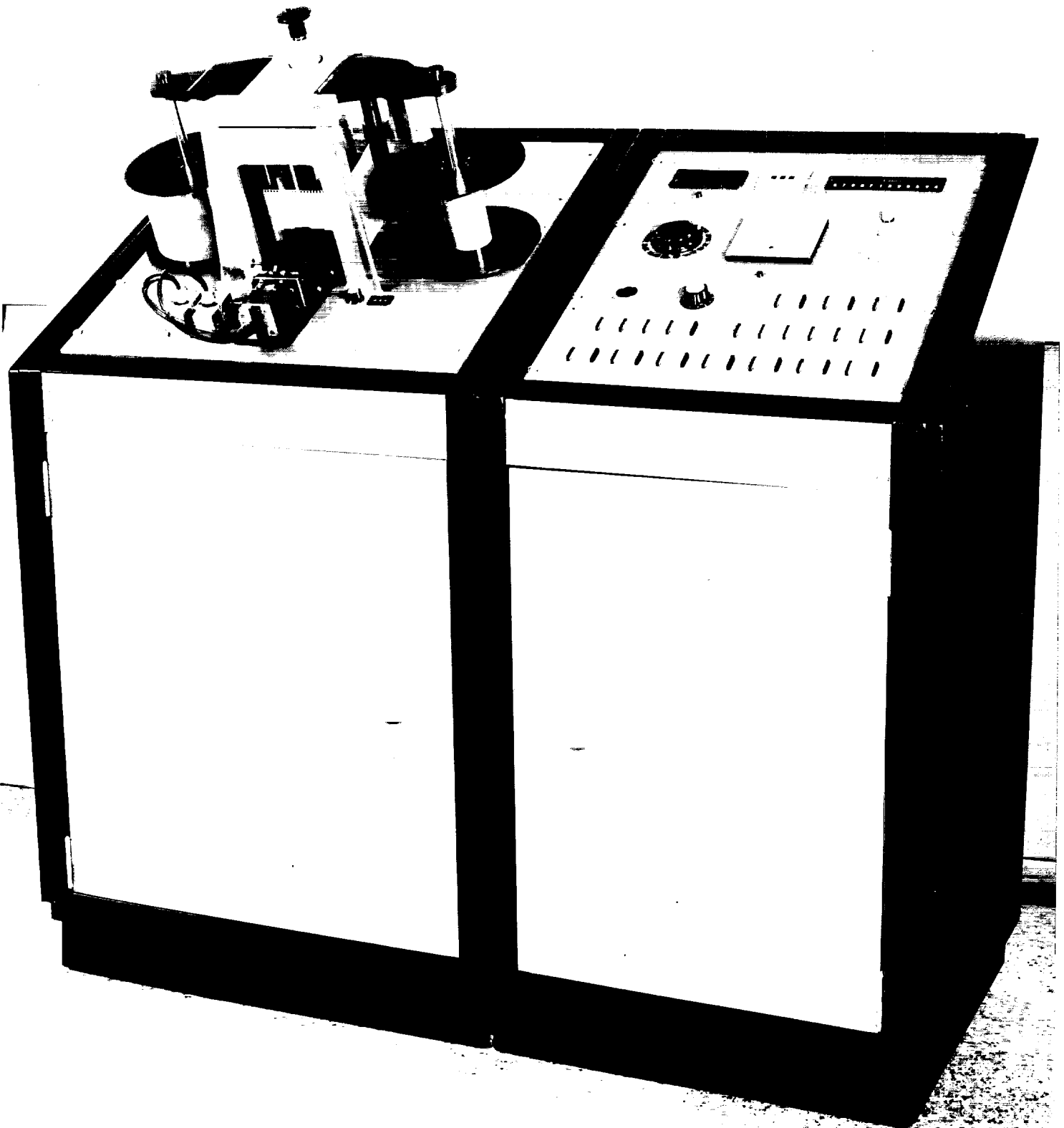


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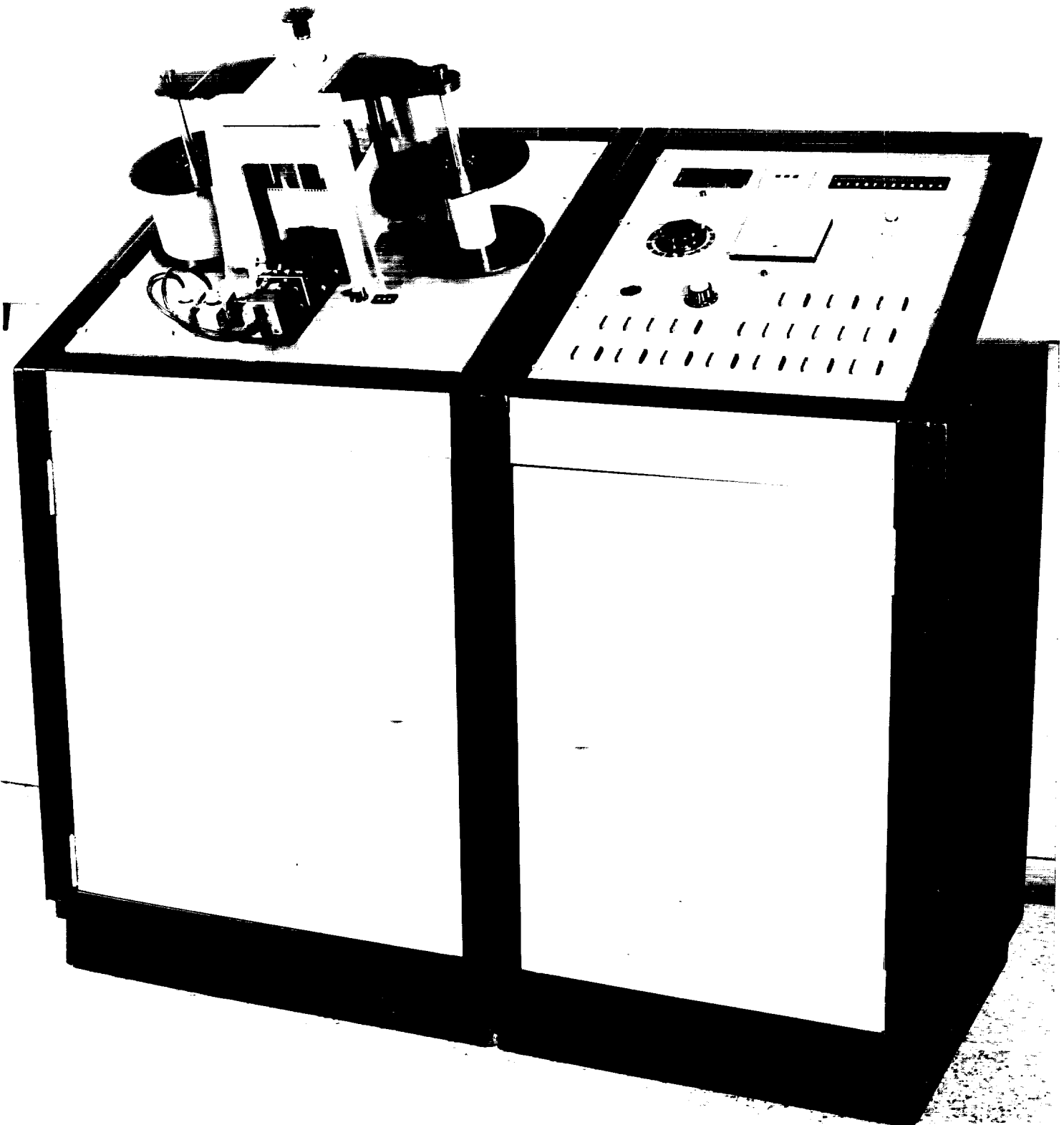
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